Cement MILL SECTION of

Concrete

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Chemical Plant Burns Its Own Lime

By Richard K. Meade

The Bathurst Co., at Bathurst, N. B., Canada, is numbered among the large timber operators and, like some of the other large lumber companies of Canada, operates a pulp plant in addition to its saw mills. In the latter both Kraft and sulfite pulp are made. Kraft pulp is produced by what is known as the "sulfate process." In this process the wood chips are digested under pressure in large enclosed steel cylinders, with strong solution of caustic soda and sodium sulfide. This liquor dissolves the rosin and other organic matter of this character in the wood, and leaves behind the pure wood pulp, which is used for making Kraft paper. The latter is very strong and is extensively used where a tough, unbleached paper is required.

One of the most important steps in the process is the recovery of the sodium sulfide and caustic soda, since these chemicals are expensive. In order to do this, the waste liquors from the digestors are evaporated and burned in rotary cylinders. All the rosin and other organic matter which has been dissolved by these chemicals from the wood is charred and a black ash is obtained, which contains the sodium salts. The ash is leached with water, which dissolves these sodium salts. During the burning the caustic soda originally used has been converted to sodium carbonate, and before the solution so obtained can be used for a new batch of wood chips it is necessary to convert the sodium carbonate back to caustic soda. This is done by boiling the liquor with lime. The lime converts the sodium carbonate to caustic soda, and is itself changed during the process to calcium carbonate. The quantity of lime used at the average pulp mill is quite considerable, and consequently the cost of lime to the pulp manufacturer is an important item in the economical production of paper pulp.

The Bathurst pulp mill is located at Bathurst, as are also two of the company's lumber mills, while the nearest high calcium lime plant is about 400 miles away. In consequence of this, the freight charges for lime are heavy, and by the time the latter has reached the plant its cost has been considerably increased.

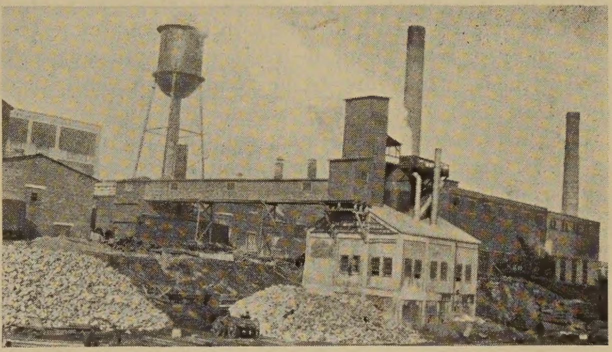


Fig. 1—Pulp Mill and Lime Plant of the Bathurst Co., Bathurst, N. B., Canada

Some time ago the Bathurst company began to look around for suitable limestone, near at hand to their pulp mill, with a view to burning their own lime. They found such a stone at Port Daniel, Quebec. The Bathurst plants are located on Chaleur Bay, an enlargement of the St. Lawrence River, while Port Daniel is on the opposite side of this bay, about 25 miles away.

The limestone found at Port Daniel is a high calcium stone, low in magnesia and other impurities. The analyses show an average of at least 96% calcium carbonate. The lime which results from the burning of this stone entirely meets the requirements of the process and fully equals the best of that formerly received from other points in Canada.

Having found a satisfactory limestone, the Bathurst company, after investigating various types of kilns, finally decided to install two Meade flame type kilns. They were led to this decision by the success which has been obtained with two of these kilns at one of the plants in Canada from which they had been obtaining lime. They, therefore, commissioned Richard K. Meade & Co., Baltimore, Md., to prepare all of the plans and specifications for the plant, as well as for the kilns. Work was started on the plant in the late fall of 1921, and it was completed and put in operation in the early spring of this year.

In designing this plant, the engineers endeavored to make it a model small lime plant. It is, of course, without special facilities for loading and shipping lime, as the Bathurst company does not anticipate going into the lime business. However, the plant is reached by a spur of the Canadian Government Railways and facilities for sending lime to the market are excellent.

The main points kept in mind in designing this plant were continuity of operation, low production cost and high quality lime. Fig. 1 gives an idea of the plant and shows its location with reference to the pulp mill, etc. The lime plant will be seen in the central foreground, while the pulp mill is behind it and at a higher elevation. The limestone stock pile is to the left, while the dock runs along at the side of this. The lime plant is located directly alongside of the dock and in line with the causticizing plant, so as to promote easy handling of both the stone and the lime.

The limestone is received from Port Daniel on lighters, which are brought across the bay by the company's tug. It is unloaded from the lighters by means of a locomotive crane and tubs. The crane operates on a standard gauge track, which parallels the dock. The crane employed is one which is used around the plant for unloading coal, etc.

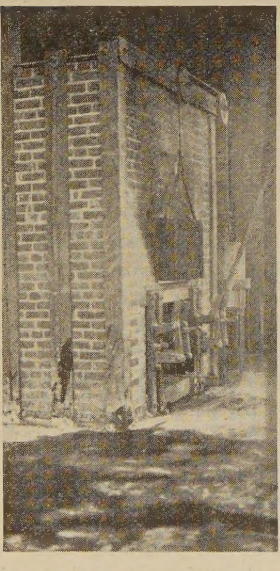
Owing to the severe Canadian winter, Chaleur Bay is not navigable during the winter months, and sufficient stone must be provided to keep the plant operating throughout this season. Space has been left along the dock, therefore, for a stock pile of sufficient size to keep the plant going at full capacity during the winter months.

There are two lime kilns. These were especially designed for this plant by Mr. Meade and embody all of his latest improvements in lime kiln construction. They are equipped with induced draft and with automatic hand stokers, which are to be used when coal is employed as fuel.

Each kiln consists of a steel shell 11 ft. in diameter by 43 ft. high. This shell rests on a base of concrete and terminates in a steel cooling cone. The steel jacket does not extend below the firing floor, as with other types of this kiln, the concrete pedestal reaching to this point.

The shells are made of steel plate bolted together, and are provided with four poke holes above the furnaces for punching down the burden in case of a "hang-up." The shells are lined to a height of 35 ft. with firebrick. The upper 8 ft. is left unlined and forms a stone bin. This is designed to carry sufficient stone to operate the kilns at night and so do away with charging during that time.

The kiln is equipped with two fire-boxes, which are built into the sides of the kiln, so that the fuel is not mixed with the stone. With this type of kiln a pure lime, free from ash, is obtained, and, since the purity of lime is important where it is to be used for causticizing soda, this type of kiln is best adapted to producing lime for this work. Each fire-box is equipped with a Huber hand stoker. Fig. 2 gives a good idea of the external appearance of the furnaces and the arrangement for operating the stokers.



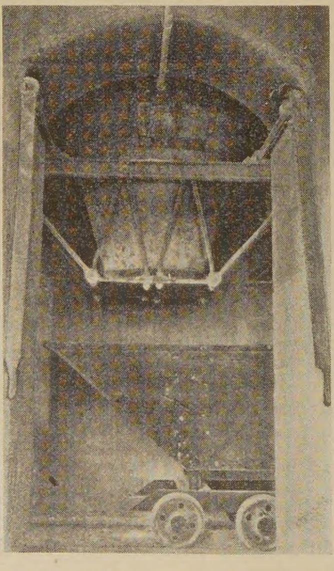


Fig. 2—(Left) Automatic Stokers for Lime Kilns

Fig. 3—(Right) Meade Drawing Mechanism for Lime Kilns

The construction of the arches which form the eyes of the furnace (or port between the furnace and the kiln) represents a departure from ordinary practice. If these arches are made with standard firebrick they are apt to give considerable trouble, as they are subjected not only to a high temperature, but also to the fluxing action of the lime. In addition the charge in the kiln bears on the arches and they are gradually broken down from the crushing weight of this.

To avoid these troubles, the engineers have adopted for these kilns a practice which they have found successful in the case of other kilns which they have designed, namely, that of using a very large special arch block for the construction of these arches. These are keyed to fit the radius of the arch, and owing to their weight and the larger key they wedge in more firmly than do the small firebrick and are not easily melted away nor displaced by the descending lime.

The shaft is lined to a height of 27 ft. with 18 in. of firebrick and 2½ in. of heat insulating brick. The balance of the shaft, constituting the preheating zone is lined with 9 in. of firebrick, no insulating brick being used. Any space left between the firebrick and the steel shells is packed with red brick and a filling of 1 in. of sand is also provided between all brick work and steel to take up expansion during heating. The insulating brick is used to reduce radiation from the kiln shell. By its use the loss of heat from this cause has been appreciably diminished and fuel has been so saved.

The cooling cones are built of heavy boiler plate, and are provided with water jackets at the top. Water is circulated through these cones, the exit being through a sight overflow which allows the attendant to see that the water is circulating properly, to judge the amount, its temperature, etc. This water jacket serves two purposes. One is to assist in cooling the lime. The more important one, however, is to prevent the burning away of the steel cone at this point, due to the combined abrasive and melting action of the red hot lime. No trouble has been experienced with these cooling cones due to leakage and the kilns give absolutely cold lime. At this plant, the lime is used as soon as it is drawn, and there is no opportunity given for it to cool anywhere else but in these cones, thus testifying to their efficiency.

The cooling cone is provided with a poke hole, closed by a slide, which can be used at any time for poking down the lime should this refuse to discharge properly.

The drawing mechanism is shown in Fig. 3. It consists of two cast iron swinging gates or doors, each supported by four rods hinged at the upper ends and operated by two link pins connected to two short lever arms keyed to a shaft. The doors fit snugly to the bottom of the cone, the adjustment being made by lock nuts. As the doors are hung from beams resting in the concrete pedestal and not from the cone itself, they are not effected by any warping of the latter.

The doors are opened and closed by a single push and pull on the operating levers. These latter are located outside of the kiln and permit the operator to stand away from the dust and heat when the lime is being drawn. The gates are smooth working and are easily operated.

Draft is obtained for both kilns by means of a Sturtevant steel plate exhauster.[1] This is belt driven by a 10-h. p. slip ring variable speed motor. Both the fan and motor are mounted in a steel platform supported on the lower chords of the roof trusses. This platform is reached by means of the elevator employed to charge the kilns, etc. The kilns are connected to the fan through separate steel flues and the fan discharges into a steel stack. The two flues and stack are shown in Figs. 1, 5 and 6. The flues are provided with sliding steel plate dampers for regulating the draft according to the individual requirements of each kiln. The intensity of the draft can also be controlled by varying the speed of the motor.

The kilns were designed to burn coal as fuel, but at the present time saw mill refuse is being used, as the Bathurst company has available a large supply of this. The present furnaces and equipment have handled the burning of this wood satisfactorily. Three men are employed on the day shift to fire the kilns, trim the coal, draw the lime and charge the kilns, while two men are required at night. One of these men tends to the firing, while the extra man is employed cleaning up the plant, doing odd repair jobs, and to be on hand in case of accident.

The limestone is raised to the top of the kilns by means of a two-ton electric elevator of the latest type. The elevator is arranged with automatic stops, so that the track on the elevator platform can be brought coincident with those at the drawing and charging floors without effort on the part of the operator. The same man who loads the cars, pushes them to the elevator, tends to the operation of this, and the dumping of the limestone into the kilns.

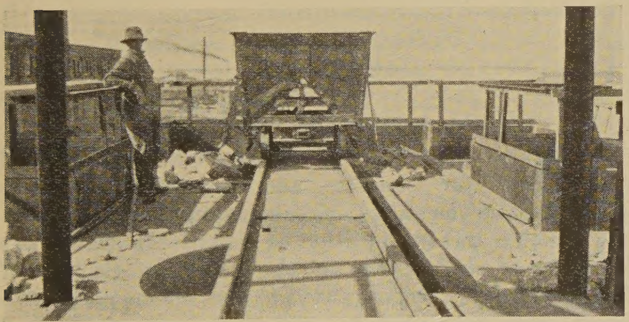
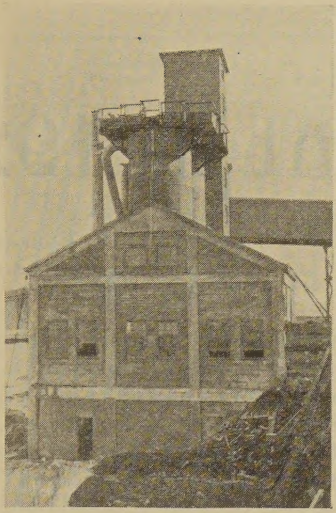


Fig. 4—Charging Hopper to Lime Kilns

The stone is discharged into the kiln through a cast iron bell and hopper charging device. These hoppers can be seen in Fig. 4. The bell is counter weighted in such a manner that when the stone is dumped into the bells these open allowing the stone to drop into the kiln. Just as soon as the contents of the bell have been discharged, the counterweight raises the latter and effectually closes the opening. This arrangement gives a quick acting charging device. This is important, as the draft of the kiln is interrupted for the time during which the bell is open. For this reason it is desirable to have the bell open for as small a time as possible.

Coal for the kiln is brought in by means of a track on the south side of the plant. The elevation of this track is considerably above the firing floor, as will be seen by referring to Fig. 1. A reinforced concrete coal bin has been built between the track and the kiln building, and this bin will hold the contents of a standard railroad coal car. The bottom of the bin is hoppered and is level with the firing floor of the kilns. The coal feeds by gravity through two openings in the wall of the kiln building, on to the firing floor, where it can be conveniently reached by the fireman. Coal is unloaded from the cars and placed in the bin by means of the locomotive crane mentioned before.



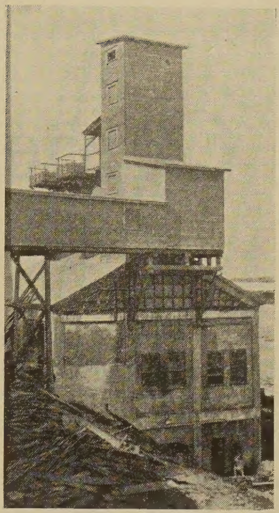


Fig. 5—(Left) End View of Lime Plant, Showing Kilns and Charging Platform

Fig. 6—(Right) End View of Lime Plant, Showing Elevator and Conveyor House

The lime is conveyed from the kiln building to the caustic plant by means of a belt conveyor. This conveyor is housed in a frame bridge connecting the two buildings. The lime is drawn from the kilns into end dump cars. No sorting is necessary, and the lime is used just as it comes from the kiln. The cars are pushed on the elevator by hand and raised by the latter sufficiently high to allow them to dump into a hopper above the belt conveyor. The lime is fed from this hopper on to the belt conveyor and carried to a storage bin in the caustic plant. The latter bin is of timber lined with sheet iron, and has a capacity of 50 tons of lime.

The buildings are of reinforced concrete with brick panels. Figs. 5 and 6 give a good idea of the type of construction. The roof trusses are of steel, with a concrete roof slab. Changes are anticipated in the caustic plant which will make a new location desirable for the belt conveyor which brings the lime from the lime plant to the latter. It is for this reason that frame was adopted for the conveyor bridge, as this structure is merely temporary.

The Calera Lime Works, at Calera, Ala., is being operated on capacity time. The company manufactures and ships lime and limestone for fluxing purposes, and also makes concrete aggregate.

The Calera company's plant has recently been enlarged, in order to better handle the increasing trade throughout the south. The company owns at Calera a large tract of limestone rock lands, the supply of limestone rock owned being almost inexhaustible.

For many years Calera has been a noted lime-making place. One of the first lime kilns erected in Alabama was at Calera. The town of Calera, which was first known as Lime Kiln Station, is on the main line of the Louisville & Nashville Railroad, about 50 miles south of Birmingham.

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[1] B. F. Sturtevant Co., Hyde Park, Mass.

Cement in 1921—A Review[1]

By Robert W. Lesley

Past President Portland Cement Association

If any evidence as to the permanent stability of the American portland cement industry were needed, it is amply furnished in the reports of the United States Geological Survey for the year 1921. The hundred million mark long sought for in American portland cement production was passed by some twenty thousand barrels in 1920, and 1921, a year of general liquidation of industrial production and wages in the United States, had little if any effect upon portland cement production and shipments. It is interesting to realize that in shipments the total falling-off is 1.3%, and so far as the demand in the United States is concerned, this is totally wiped out by the falling-off in exports of 1921—a decrease of 1,804,783 bbls.—so that the real demand of this country in a year of possibly the greatest business depression known for a generation equaled the greatest portland cement year ever known to the industry. It is true that in the latter months of 1921 the business boom which had existed in the earlier months in the building industry began to show symptoms of decrease, and toward November and December, owing to cancellations by contractors and dealers, as well as the abandonment of many large enterprises in the construction field, stocks began to pile up in the storehouses at the mills, and the stock on hand at the end of 1921 was the largest ever known to the trade. This large business of 1921 is attributed to a great extent to the successful development of the concrete road, the building of which went on in almost every state of the Union and caused marked increases in output of some of the commercial districts in the Middle and Far West. It might be naturally expected that with a year such as is above described the industry should have been largely profitable, but unfortunately in midsummer a reduction in the price of bags, in which cement is usually shipped, was made, and the charging off at the end of the year of many millions of dollars in bag inventories caused marked decreases in anticipated profits of the various mills in the industry.

The following figures from reports of the United States Geological Survey cover the principal statistical facts of the industry:

TABLE I.—PRINCIPAL HYDRAULIC CEMENTS SHIPPED FROM FACTORIES IN THE UNITED STATES(a)

Class.	1919.		1920.		1921.	
	Quantity (Barrels).	Value.	Quantity (Barrels).	Value.	Quantity (Barrels).	Value.
Portland	85,612,899	$146,734,844	96,311,719	$194,439,025	95,507,147	180,778,415
Natural Puzzolan	528,589	583,554	767,481	1,150,890	539,402	897,025
Total	86,141,488	$147,318,398	97,079,200	$195,589,915	96,046,549	$181,675,440

(a) U. S. Geol. Surv.

Table 1 shows the quantity and value of the principal hydraulic cements shipped from factories in the United States in the years 1919, 1920, and 1921.

In Table 2 will be found the figures of portland cement produced and in stock in the United States by commercial districts and by states.

Table 3 tells the story of portland cement shipped in the United States by commercial districts and by states.

Table 4 shows the average price per barrel of portland cement from 1870 to 1921.

From Table 5 may be had information as to the fuel used in burning cement.

Table 6 shows a great decrease in the imports of foreign cement. This is easily explained by the fact that owing to the great shortage of the material in 1920, several thousand barrels were imported from Canada to meet this demand, and some increase also was made in imports from other countries.

Table 7 shows the exports of the industry. The effect of the world's financial troubles in 1921 showed itself especially in South American markets, into which for a number of years American portland cement was finding a large field. The 1921 figures show a large decrease in exports, possibly explainable by the reasons above given, and further explainable by the revival of exports from Germany, England, Belgium, and France to their old customers in South America.

The figures of consumption of portland cement per capita show but slight decrease from 1920; the maximum was reached in 1916. The figures are as follows:

Year	Bbls.
1914	0.77
1915	0.83
1916	0.89
1917	0.84
1918	0.64
1919	0.77
1920	0.86
1921	0.86

Scientific Developments

During the year the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete held numerous meetings in connection with its work. In December the specification as tentatively drawn was discussed at six sessions of the American Society of Civil Engineers, when criticism and comment on the report were presented by engineers, contractors, and others interested in the various subjects dealt with. It is expected that during the year 1922 the specification in its tenative form will be presented for consideration to the American Society of Civil Engineers, the American Society for Testing Materials, the Concrete Institute, the Portland Cement Association, and the American Railway Engineering Association, the several engineering bodies represented upon and constituting the membership of the Joint Committee.

In the field of concrete an important contribution was made by Committee C-2 on Reinforced Concrete of the American Society for Testing Materials. It was in the shape of proposed tentative rules for the inspection of concrete and reinforced concrete work. This report, a well considered and exhaustive one, deals with the all-essential matter of inspection, including the qualifications of the inspector as well as the character of the inspection required to secure safety and permanence in the large and growing science of concrete construction.

Through its Committee on Fireproofing and its Committee on Concrete and Concrete Aggregates, the same society did much valuable work calculated to lead to

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[1] From *Mineral Industry.*

TABLE II.—PORTLAND CEMENT PRODUCED, AND IN STOCK IN THE UNITED STATES, BY DISTRICTS, AND STATES (a)

Commercial District.	Production.							
	Active Plants.		Quantity (Barrels).		Percentage of Change.	Stock (Barrels).		Percentage of increase
	1920	1921	1920	1921		1920 (revised)	1921	
Eastern Pennsylvania, New Jersey, and Maryland	22	22	27,137,594	25,571,726	− 6	2,241,160	3,000,486	34
New York	9	8	5,885,058	5,294,188	−10	488,209	790,056	62
Ohio, Western Pennsylvania, and West Virginia	9	10	7,988,934	9,501,895	+19	835,004	1,151,041	38
Michigan	11	11	4,891,457	5,777,533	+18	666,389	760,503	14
Illinois, Indiana, and Kentucky	11	10	16,886,831	17,050,741	+ 1	1,467,839	2,095,306	43
Virginia, Tennessee, Alabama, and Georgia	7	7	3,567,890	5,065,854	+42	224,978	374,105	66
Eastern Missouri, Iowa, and Minnesota	9	9	11,728,062	9,951,283	−15	1,199,744	1,717,969	43
Western Missouri, Nebraska, Kansas, and Oklahoma	12	11	6,967,129	6,351,747	− 9	622,378	873,734	40
Texas	5	5	2,562,208	2,668,741	+ 4	143,502	296,296	107
Colorado and Utah	5	5	2,392,741	1,860,573	−22	165,266	215,727	31
California	9	9	7,098,084	7,302,784	+ 3	441,138	561,175	27
Oregon, Washington, and Montana	8	9	2,917,257	2,444,984	−16	337,460	350,966	4
	117	115	100,023,245	98,842,049	− 1	8,833,067	12,187,364	38
California	9	9	7,098,084	7,302,784	+ 3	463,930	561,175	+ 27
Illinois	4	4	5,538,558	5,587,825	+ 1	403,640	753,954	+ 87
Indiana	6	....	10,787,751	....	....	1,047,960	....	....
Iowa	4	4	4,849,228	4,590,920	− 5	553,607	993,090	+ 79
Kansas	7	7	4,340,794	3,781,494	−13	399,059	536,971	+ 35
Michigan	11	11	4,891,457	5,777,533	+18	666,071	760,503	+ 14
Missouri	5	5	6,017,517	4,446,091	−26	571,697	641,580	+ 12
New York	9	8	5,885,058	5,294,188	−10	553,989	790,056	+ 62
Ohio	5	5	1,780,433	2,563,773	+44	197,521	238,676	+ 23
Oklahoma	3	2	1,553,652	1,631,525	+ 5	134,438	142,644	+ 33
Oregon and Washington	6	....	2,218,905	....	....	247,809	....	....
Pennsylvania	21	22	28,269,314	27,628,598	− 2	2,388,836	3,413,359	+ 42
Texas	5	5	2,562,208	2,668,741	+ 4	143,502	296,296	+107
Utah	3	3	1,093,741	712,773	−35	105,397	139,107	+ 23
Other States (b)	19	30	13,136,545	26,855,804	....	1,063,590	2,919,953	.....
	117	115	100,023,245	98,842,049	− 1	8,941,046	12,187,364	+ 38

(a) E. F. Burchard, U. S. Geol. Surv.
(b) Alabama, Colorado, Georgia, Kentucky, Maryland, Minnesota, Montana, Nebraska, New Jersey, Tennessee, Virginia, and West Virginia.

TABLE III.—PORTLAND CEMENT SHIPPED IN THE UNITED STATES, BY DISTRICTS AND STATES (a)

Commercial District.	Shipments.					Average Factory Price Per Barrel.	
	1920.		1921.		Percentage of Change in Quantity.		
	Quanti (Barrels).	Value.	Quantity (Barrels).	Value.		1920	1921.
Eastern Pennsylvania, New Jersey, and Maryland	26,629,217	$51,473,529	24,841,973	$44,110,573	− 7	$1.93	$1.78
New York	6,049,150	12,206,698	4,993,341	9,403,015	−18	2.02	1.88
Ohio, Western Pennsylvania, and West Virginia	7,519,129	14,623,740	9,185,858	15,947,184	+22	1.94	1.74
Michigan	4,442,455	10,939,633	5,680,156	10,300,289	+28	2.46	1.81
Illinois, Indiana, and Kentucky	15,871,121	29,762,420	16,423,356	28,468,092	+ 4	1.88	1.73
Virginia, Tennessee, Alabama, and Georgia	3,390,909	7,331,414	4,916,245	9,879,466	+45	2.16	2.01
Eastern Missouri, Iowa, and Minnesota	10,883,306	20,999,548	9,432,573	16,805,272	−13	1.93	1.78
Western Missouri, Nebraska, Kansas, and Oklahoma	6,611,565	13,971,290	6,100,391	12,503,617		2.11	2.05
Texas	2,626,130	5,898,972	2,514,045	5,902,863	− 4		2.35
Colorado and Utah	2,315,219	5,208,600	1,806,931	4,330,333	−22	2.25	2.40
California	7,064,010	15,449,645	7,180,700	16,856,258	+ 2	2.19	2.35
Oregon, Washington, and Montana	2,909,508	6,573,536	2,431,578	6,271,453	−16	2.26	2.58
	96,311,719	$194,439,025	95,507,147	$180,778,415	− 1	$2.02	$1.89
California		$15,449,645	7,180,700	$16,856,258	+ 2	$2.19	$2.35
Illinois	5,148,040	10,012,158	5,237,510	9,092,982	+ 2	1.94	1.74
Indiana	10,191,126	8,649,115	....	....	....	1.83	....
Iowa	4,421,783	8,[illegible]42,854	4,151,439	7,439,983	− 6	1.98	1.79
Kansas	4,158,399	8,649,157	3,643,582	7,253,944	−12	2.08	1.99
Michigan	4,442,455	10,939,633	5,680,156	10,300,289	+28	2.46	1.81
Missouri	5,605,952	10,980,453	4,375,712	8,034,540	−22	1.96	1.84
New York	6,049,150	12,206,698	4,993,341	9,403,015	−18	2.02	1.88
Ohio	1,670,958	3,561,490	2,518,723	4,615,492	+51	2.13	1.83
Oklahoma	1,484,698	3,284,41[illegible]	1,596,566	3,420,093	+ 8	2.21	2.14
Oregon and Washington	2,198,743	4,965,560	....	....	....	2.26	....
Pennsylvania	27,662,116	52,632,082	26,622,367	46,881,625	− 4	1.90	1.76
Texas	2,626,130	5,898,972	2,514,045	5,902,863	− 4	2.25	2.35
Utah	1,022,639	2,314,413	683,446	1,747,191	−33	2.26	2.51
Other States (b)	12,565,520	26,152,383	26,309,560	49,860,140	....	2.08	....
	96,311,719	$194,439,025	95,507,147	$180,778,415	− 1	$2.02	$1.89

(a) E. F. Burchard, U. S. Geol. Surv.
(b) Alabama, Colorado, Georgia, Kentucky, Maryland, Minnesota, Montana, Nebraska, New Jersey, Tennessee, Virginia, and West Virginia.

better standards in fire-resisting construction and improved methods in the selection and use of sands and aggregates.

A matter of importance to the cement industry and engineering profession alike, was the agreement concluded on the subject of specifications and tests for portland cement, thus creating a single specification covering both commercial and governmental uses. This was followed by acceptance of the adopted standard on the part of the American Engineering Standards Committee, and it is now known as American Standard Specification No. 1. To those who can look back to the early period of cement manufacture in the United States, when specifications were as many and varied as individual preferences in the matter, and who participated in the prolonged research and discussion covering the intervening time, this general acceptance of a single specification will seem an important epoch in the history and use of portland cement in the United States.

In the manufacturing end of the industry increased

TABLE IV.—AVERAGE PRICE PER BARREL OF PORTLAND CEMENT, 1870-1921

1870-1880	$3.00	1896	$1.57	1909	$0.813
1881	2.50	1897	1.61	1910	0.891
1882	2.01	1898	1.62	1911	0.844
1883	2.15	1899	1.43	1912	0.813
1884	2.10	1900	1.09	1913	1.005
1885-1888	1.95	1901	0.99	1914	0.927
1889	1.67	1902	1.21	1915	0.860
1890	2.09	1903	1.24	1916	1.103
1891	2.13	1904	0.88	1917	1.354
1892	2.11	1905	0.94	1918	1.596
1893	1.91	1906	1.13	1919	1.690
1894	1.73	1907	1.11	1920	2.020
1895	1.60	1908	0.85	1921	1.890

TABLE V.—STATISTICS SHOWING FUEL USED IN BURNING PORTLAND CEMENT (a)

Fuel.	1920.				1921.			
	Number of Plants.	Number of Kilns.	Barrels.	Percentage of Total.	Number of Plants.	Number of Kilns.	Barrels.	Percentage of Total.
Coal	96	629	81,265,667	81.2	92	607	80,557,675	81.5
Coal and oil	1	24	6,676,029	6.7	3	31	5,536,128	5.6
Coal and gas	1	6			1	6		
Oil	16	79	9,495,798	9.5	16	81	10,123,781	10.2
Coal, oil and gas	2	9	2,585,751	2.6	2	9	2,624,465	2.7
Natural gas	1	6			1	6		
Total	117	753	100,023,245	100.0	115	740	98,842,049	100.0

(a) U. S. Geol. Surv.

TABLE VI.—IMPORTS OF FOREIGN CEMENT, IN BARRELS OF 380 LB.

1887	1,514,095	1899	2,108,388	1911	164,670
1888	1,835,504	1900	2,386,683	1912	68,503
1889	1,740,356	1901	939,330	1913	85,470
1890	1,940,186	1902	1,963,023	1914	120,906
1891	2,988,313	1903	2,251,969	1915	42,218
1892	2,440,654	1904	968,409	1916	1,836
1893	2,674,149	1905	896,845	1917	2,323
1894	2,638,107	1906	2,273,493	1918	302
1895	2,997,395	1907	2,033,438	1919	8,454
1896	2,989,597	1908	842,121	1920	498,036
1897	2,090,924	1909	443,888	1921	121,030
1898	1,152,861	1910	306,863		

TABLE VII.—EXPORTS OF CEMENT, IN BARRELS

Year.	Quantity.	Value.	Percentage of Total.	Year.	Quantity.	Value.	Percentage of Total.
1904	774,940	$1,104,086	2.4	1913	2,964,358	$4,270,666	3.3
1905	897,686	1,387,906	2.2	1914	2,140,197	3,088,809	2.5
1906	583,299	944,886	1.1	1915	2,565,031	3,361,451	2.9
1907	900,550	1,450,841	1.7	1916	2,563,976	3,828,231	2.7
1908	846,528	1,249,229	1.6	1917	2,586,215	5,328,536	2.8
1909	1,056,922	1,417,534	1.6	1918	2,252,446	5,912,166	3.2
1910	2,475,957	3,477,981	3.2	1919	2,463,573	7,513,389	2.9
1911	3,135,409	4,632,215	3.9	1920	2,985,807	10,045,369	3.1
1912	4,215,532	6,160,341	5.1	1921	1,181,014	4,276,986	1.3

prices for coal and increased freight rates thereon have brought the fuel problem to the front rank as an economic proposition. The waste-heat boiler operating with the waste gases of the rotary kiln, has made rapid strides during the year, and many plants in various parts of the country have made successful and profitable installations. Although originally suggested and put into operation in the later days of the last century, the first installations were not successful, but better engineering in both plants and boiler practice has made this form of waste-heat recovery a great feature of the year. The fuel engineer in the cement plant is another outcome of the desire to save coal and reduce cost. His work will be of great value to the future of the industry.

The shipment of potash from Germany and Alsace has put a stop to potash production in American cement mills which, during war times, had attained some degree of success. With potash at $300 to $400 a ton, it could be produced at a fair profit with cement materials containing 1% to 2% of potash, but with the reopening of the foreign mines and reduced sea freights, prices were brought so low as to check the further development of the American industry.

Cement Activities in Foreign Fields

Brazil—German and French technical papers, commenting on the importations of portland cement into Brazil, show that in the first quarter of 1921 there were imported 46,983 metric tons. Of this Germany shipped 34%, almost regaining her old pre-eminence in the Brazilian market, shipments amounting to about 43% of the total before the war. American shipments, which in 1920 had reached 44% of total imports, fell to 12½% in the first three months of 1921, notwithstanding a preferential tariff advantage of 20%. Quotations show a large difference in favor of Germany for cement delivered in Brazil, the figure being $179 per ton, as against $225 per ton for the American product.

Belgium—Belgian production of portland cement in 1920 amounted to 648,147 metric tons valued at 95,600,000 francs. Before the war production was about 1,500,000 tons. It is noted that owing to improvement in machinery, kilns, and other appliances the monthly capacity of many plants has been largely increased, and in some cases doubled. The Belgian Association of Portland Cement Manufacturers, 14 in all, produced during the first five months of 1921 267,941 tons. In the Tournai field, where both natural and artificial portland cements are made, great improvements have been introduced in the form of rotary kilns of large capacity and improved grinding machinery. Toward the end of the year the Belgian Portland Cement Association, which had existed for nearly 20 years, dissolved owing to internal dissensions.

Canada—Production of portland cement in Canada during 1921 showed an increase over that of the preceding year. The output for 1921 was 2,723,072 bbls., as against 2,035,594 bbls. in 1920. Ontario produced the great bulk of cement, although a number of makers in Quebec and New Brunswick reported appreciable quantities. At Owen Sound a new plant, with a capacity of 3,000 to 4,000 bbls. per day, has been erected. The cost of manufacture in Canada is somewhat less today than in 1920, but even now labor, coal, materials, and supplies are from 125% to 150% greater than in 1914.

Ceylon—Investigation as to the portland cement making resources of Ceylon has been under way. The main difficulty encountered is the high price of coal, and the possibility of developing a small hydro-electric plant is being studied. There is the further interesting statement that investigation as to the suitability of cocoanut shells for fuel is under way.

China—There are six portland cement plants operating in China at the present time. The daily capacity of these plants runs from 350 to 3,000 bbls., and the average local price is between $6.50 and $7.50, Mexican, per bbl. of 375 lbs. Ho Hong Portland Cement Co., near Singapore, Straits Settlements, has a plant thoroughly American. It uses the calcium carbonate from coral which is pried loose by Chinese coolies, loaded into barges and towed to the plant. The plant was started by American engineers with an American chemist in charge of the laboratory. It has an output of 800 bbls. per day.

Congo—A new Belgian company, with a capital of 10,000,000 francs, has been organized to build a plant at Katanga, in the Belgian Congo.

Dalmatia—At the present time there are six cement plants in Dalmatia, with a combined output of 500,000 metric tons per year. The locality is an ideal center for the industry, as the raw material not only lies close to the coast, but is of very good quality. Despite the high price of coal, profits varied from 25% to 40% during 1919, the year production started. The industry is under the control of Italian capital, with reports that English capitalists have begun negotiating for the purchase of some of the largest factories.

Dominican Republic—This country shows, as is the case with most of the South American and West Indian countries, a reduction in American imports of portland cement, with an increase in imports from Germany. In 1920 the imports from Germany were valued at $3,915, while in 1921 they increased to $38,322. This represented but nine months. During the same period of time United States imports fell from a valuation of $396,860 to $129,703.

England—At a meeting of the Associated Portland Cement Manufacturers, Ltd., a set-back in the trade during 1921 was ascribed to the disastrous effects of the coal strike, the inability to compete in the overseas market with continental manufacturers, the latter due to depreciated currencies, and the Government change of policy regarding its housing schemes. Necessity for writing down the value of stocks also affected profits. Owing to the high cost of coal there is no immediate likelihood of the price of portland cement receding to the pre-war figure. The above company is acquiring the works of the Kent Portland Cement Co., Ltd., this plant having cost £2,000,000. It has a capacity of 3,000 tons per week. It is intended to form at an early date an Indian company to take over the cement works which the company, together with the British Portland Cement Manufacturers, Ltd. is erecting in India. The British Portland Cement Co., owned by the Associated Manufacturers showed a net profit in 1921 of £214,212, as against £323,406 in 1920.

Finland—Finland has only two cement works. It is estimated that production in 1920 amounted to about 400,000 bbls., resulting in greatly decreased exports. The outlook for the current year indicates enough cement to more than fill home requirements, leaving a surplus to be exported.

France—During 1921 there was a remarkable revival of the cement industry in France, especially in the northeast. The restoration of devastated provinces was the prime factor in the increased demand.

Germany—The outstanding feature of the German portland cement industry has been investment of capital in excess of the actual requirements. Before the war production capacity was estimated at 12,000,000 tons, whereas actual output in 1913 amounted to only 7,500,000 tons. The productive capacity has been lowered since by the loss of 500,000 tons, constituting the annual capacity of works located in territories ceded under the terms of the peace treaty, and by a further 1,750,000 tons representing the capacity of shut-down plants. Annual production is now estimated at 4,000,000 tons.

Protection against new domestic competition is afforded by government decree promulgated in 1916, prohibiting erection of new or extension of existing plants. This virtually confers a monopoly upon existing works. The German industry comprises eight main sections, grouped according to the principal production centers. Prices reached a maximum in the spring of 1920 at 4,061 marks, but were reduced by 661 marks in August and again by 200 marks in November. Present prices are 3,616 marks for the Northern Association, 3,426 marks for the Rhenish-Westphalian Association, and 3,709 marks for the Southern Association. The further development of the industry depends largely upon increasing production and reducing overhead expenses.

Guatemala—The Novella Cement Co. has a plant in the city of Guatemala, capital of this country. Resources include a very high grade limestone, clay, and the volcanic ash known as tufa. The last is used in place of clay, as it is nearer the mills and much easier to handle. The fuel is Mexican crude oil for cement burning and drying.

India—A new cement works is projected in British Malaya, with a capacity of 30,000 to 40,000 tons per year.

Jamaica—The Government of Jamaica has under consideration the establishment of a cement factory and has employed experts from England to make preliminary investigations. Their first report in the matter expresses the conviction that the project under proper management would be a commercial success, yielding large returns on the capital required.

Japan—Talk of a cement combine in Japan is being renewed, though nothing definite has developed along that line. The demand for cement is good and an increase in price appears to be warranted. During 1919 the production of portland cement reached 6,500,000 bbls., produced by about 20 companies employing 7,000 laborers. During the war Japan secured a new cement market in Java, but doubt as to holding it exists.

Jugo-Slavia—There are a number of works in this country, some employing as high as 800 hands. A large part of the domestic production is used in the country itself, though works in Belgrade shipped over 80% of its product overseas.

Mexico—The combined production of the two leading cement plants in Mexico is equivalent to about 2,400 bbls. per day. This amount is more than sufficient to take up the quantities of cement imported into that country in the last few years. Besides these plants, one has recently started near Monterey, a second plant is under construction there, while a third started last year at Puebla. All these plants manufacture in strict accordance with the specifications of the American Society for Testing Materials, and the mills are equipped with the most modern American machinery, all of them being fortunate in having excellent raw materials.

Mozambique—The new plant of the Mozambique Portland Cement Co., Ltd., at Delagoa Bay, has recently been inspected by British consulting engineers, who are very favorably impressed with the prospects of the concern. Considerable delay in the shipment of supplies and machinery has occurred. It is interesting to note that the Germans so far underbid other competitors for the mechanical equipment of the plant that the directors felt responsibility to shareholders compelled acceptance of the German tenders.

Philippines—The town of Naga, Island of Cebu, is now conceded the best cement field in the Philippines, according to the Bureau of Science, Manila. Tests of raw materials point to the feasibility of a cement venture on a large scale. The proximity of coal mines will provide fuel by gravity, and it is reported that a plant will soon be erected in the locality by the National Cement Co., mostly owned by the Government.

South Africa—The Union of South Africa now has six cement factories, none of them of very large capacity, however. The Portland Cement Co., Ltd., of Cape Town, proposes to erect a plant there, with a capacity of 500,000 bags a year. The demand for cement is increasing and proposed housing plans will add to its consumption.

South America—Special reference has been made to Brazil and the rehabilitation of the German cement trade in that country. Taking South America as a whole, imports of portland cement from the United States show marked decline, with the exception of Bolivia. In that country the value of portland cement imported from the United States in 1921 amounted to about $93,000, as against a little over $28,000 in 1920. The decline in the value of imports from the United States in other countries was as follows:

Country	1920	1921
Argentina	$ 861,217	$114,472
Brazil	1,555,124	134,780
Chile	314,977	38,686
Colombia	557,012	276,034
Ecuador	85,548	21,504

. . *Spain*—A new portland cement works is under construction at Bilbao.

Modern Concrete Structure Replaces Old Buildings

The new reinforced concrete storehouse and shop building recently completed by the Dewey Portland Cement Co. is interesting from the standpoint of building methods employed, and is considered somewhat in advance of ordinary construction in connection with cement plants. The two-story building was erected over and around the old buildings without interfering with operation at any time.

The old buildings replaced were constructed in 1906, of frame covered with galvanized corrugated steel, and with composition roof. These old buildings were at all times about the worst kind of fire trap, and for several years they were too small. A point had been reached where they had to be rebuilt, as the lumber was showing dry rot and the composition roof, although it had been replaced several times, was in need of replacement. The galvanized corrugated steel had been replaced in many sections, but a condition had been reached such that much more replacement was needed. As a result, it was decided to erect new buildings, and the concrete structure was designed to surround the old building on all sides and go over it, as shown in the accompanying illustrations.

In building this new structure, the Dewey company refrained from the use of structural steel, which so many cement companies use, and instead used cement of its own manufacture and broken stone aggregate of its own production. The sand was procured at Tulsa, less than 50 miles distant. The reinforcing steel, however, could not be obtained locally and had to be transported from a distant point.

Construction was carried on while the shops and storehouse were in use. The method followed out was begun by building all of the side walls first, leaving openings only where necesssary, filling in the openings after the building was nearly completed.

The next step was to put up the columns. In doing this, the forms were run up through the roof of the old building, and the holes patched where the openings were made in the old roof, so as to keep out the rain. After the completion of the columns, the roof slab was poured over the one-third of the building toward the south, and then over the north one-third.

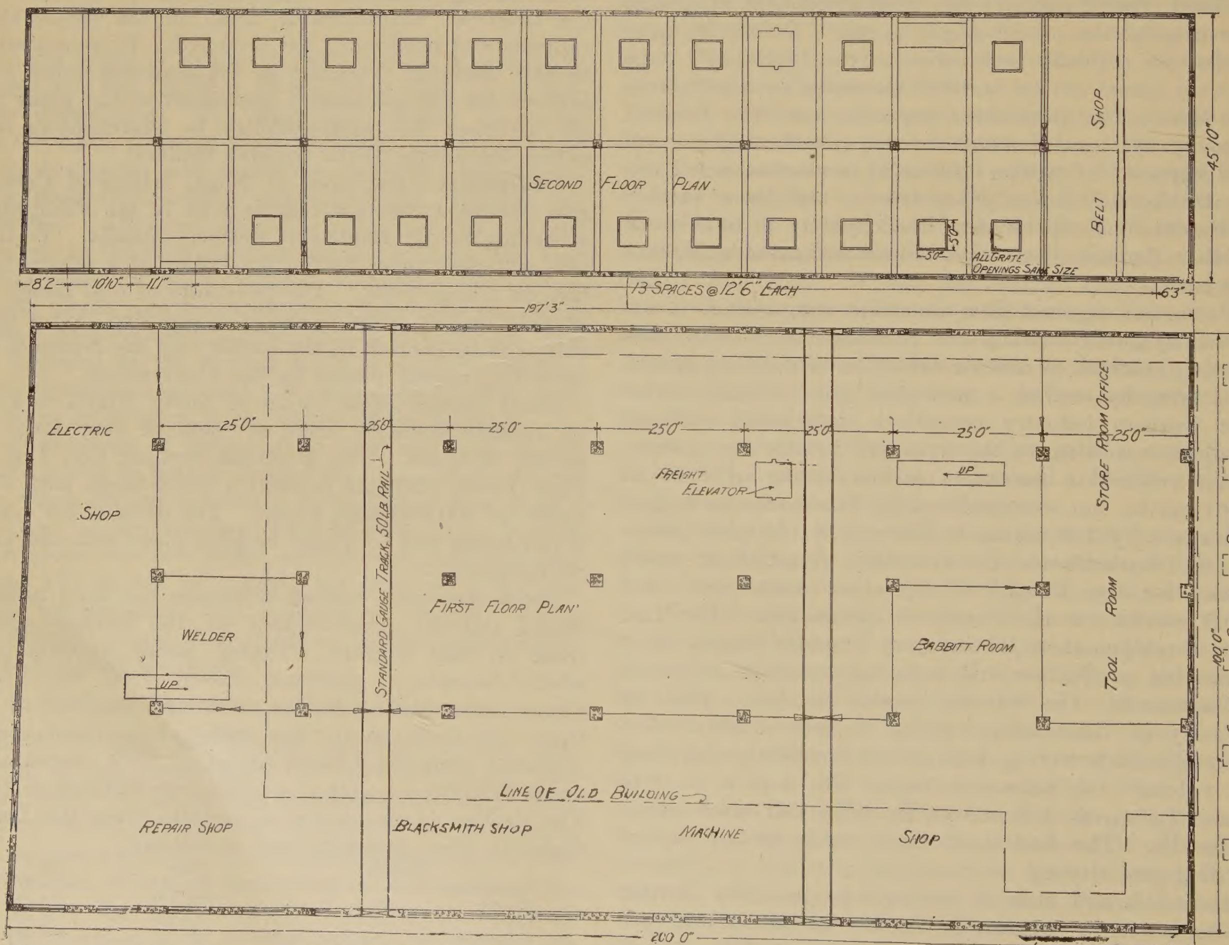


Fig. 1—First and Second Floor Plans of New Building Showing Also Line of Old Building Replaced

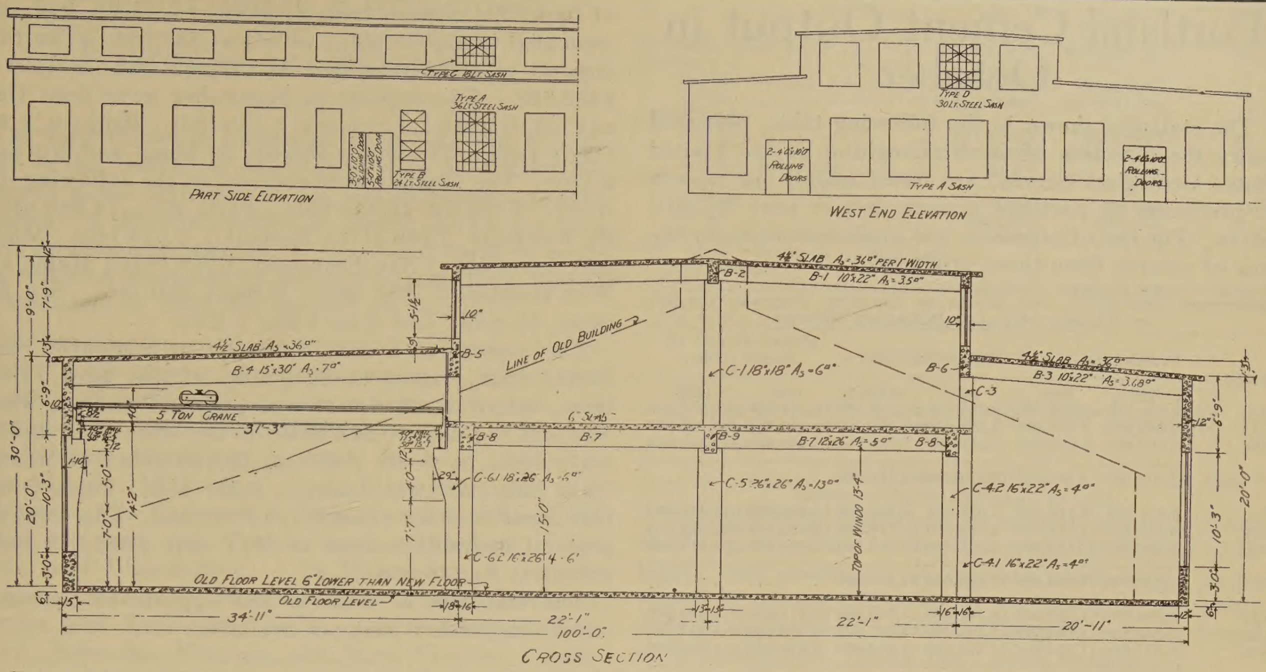


FIG. 2—TYPICAL ELEVATIONS AND CROSS SECTION OF NEW STRUCTURE, SHOWING LINE OF OLD BUILDING

Up to this point it was intended to put the roof on next, rather than the second floor, but plans were changed and the second floor poured, and, fortunately, this was completed without any interference on account of bad weather conditions.

The last move was to put the roof on the center one-third, and although this was done during a very rainy period, no loss was suffered and but very little inconvenience. After the roof was all finished the remaining floors were constructed.

The method used in pouring the floors was to clear away as large a section as space requirements would permit, pour that section of the new floor, and then move on to it and clear away another section, repeating this operation as often as the hardening of the concrete would permit, until the entire floor was poured.

For the above information CONCRETE is indebted to H. F. Tyler, of the Dewey Portland Cement Co., who was in close contact with the construction work in connection with the new building.

Belgians and Germans Dominate European Cement Industry

Belgian and German cement makers have succeeded through the policy of price cutting in almost completely arresting exportation of the French product in the last three months, according to reports received by the Iron and Steel Division of the Department of Commerce. The factories at Boulogne-sur-Mer, the largest cement manufacturing center in France, are capable of producing 600,000 tons annually, or about three-fifths of the total French production. Conditions in this region are typical of the situation throughout the entire industry. It is estimated that the cement industry during the last week of July was working at about 80% of normal, whereas the first weeks of the month it was only working at 70%.

French exporters are still shipping a small quantity of cement, which they are content to sell at the cost of production. The causes for the differences in prices include the application of the French eight-hour day law, the high freight charges, and the high cost of coal.

An authority on the French cement industry said: "Unless the factories in the Boulogne-sur-Mer district can sell their products abroad, they will be forced for a time to reduce their force and probably close their doors. The situation has improved somewhat during the past few months, but it is still dark for us. We have one great hope—that the superiority of our products will eventually predominate and that we will regain the markets we are now losing."

Big Blast Fired in New Zealand

The record blasting charge which was fired on the property of Wilsons (N. Z.) Portland Cement Co., at Portland, near Whangarei, on July 15, consisted of a mixture of blasting gelatine and gelignite of a total weight of about 10½ tons. Nineteen holes, 6 in. in diameter, and varying in depth from 115 ft. to 170 ft., were bored with a well drill. The huge mass of explosives was distributed among these holes and well tamped down, the whole charge being connected by means of electric detonators and Cordeau-Bickford fuse, a class of fuse that has not hitherto been used in New Zealand. Instantaneous detonation and explosion of the whole of the widespread charge was thus secured.

The charge, which shattered about 100,000 tons of limestone, was fired by the simple act of pressing a button in a protected position about 100 yds. from the quarry. The explosion was in every way a complete success. There was no wide distribution of rock or dust, and it was remarked that two steam shovels about 200 ft. away were not struck by even a pebble. This is the largest blasting charge ever fired in New Zealand, the heaviest previously recorded being about six tons. The limestone that has been dislodged is sufficiently broken to be handled by the steam shovels, which will place the stone on trucks ready for transport to the mill, about a mile and a half distant. The quantity of stone now available is estimated to be sufficient to keep the company's mill going for at least ten months.—*Auckland Weekly News.*

Portland Cement Output in October

The statistics shown in the following table, prepared under the direction of G. F. Loughlin, of the United States Geological Survey, are based mainly on reports of producers of portland cement, but in part on estimates. The use of estimates was made necessary by the lack of returns from three producers.

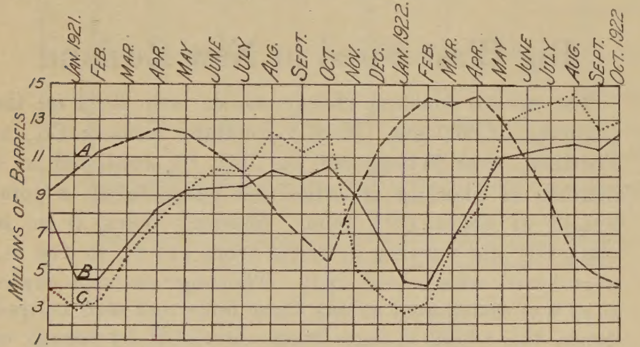
PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT IN OCTOBER, 1922, AND PRECEDING MONTHS

Month	Production (bbls.)		Shipments (bbls.)		Stocks at end of Month (bbls.)	
	1921	1922	1921	1922	1921	1922
Jan.	4,098,000	*a*4,291,000	2,539,000	*a*2,931,000	10,300,000	*a*13,316,000
Feb.	4,379,000	4,278,000	3,331,000	3,285,000	11,400,000	*a*14,142,000
Mar.	6,763,000	6,685,000	6,221,000	7,002,000	12,000,000	*a*13,848,000
1st quar.	15,240,000	15,254,000	12,091,000	13,218,000	....	....
Apr.	8,651,000	9,243,000	7,919,000	8,592,000	12,600,000	*a*14,470,000
May	9,281,000	11,176,000	9,488,000	12,749,000	12,450,000	*a*12,893,000
June	9,296,000	11,245,000	10,577,000	13,470,000	11,150,000	*a*10,718,000
2d quar.	27,228,000	31,664,000	27,984,000	34,811,000	....	....
July	9,568,000	11,557,000	10,301,000	13,850,000	10,414,000	*a* 8,433,000
Aug.	10,244,000	11,664,000	12,340,000	14,361,000	8,280,000	*a* 5,746,000
Sept.	10,027,000	11,424,000	11,329,000	12,444,000	6,953,000	*a* 4,724,000
3d quar.	29,839,000	34,645,000	33,970,000	40,655,000	....	....
Oct.	10,506,000	12,287,000	12,114,000	12,854,000	5,348,000	4,157,000
Nov.	8,921,000	....	5,195,000	....	9,091,000	....
Dec.	6,559,000	....	3,697,000	....	11,938,000	....
4th quar.	25,986,000	....	21,006,000	....	....	....
	98,293,000	....	95,031,000	....	....	....

a Revised.

Stocks of clinker, or unground cement, at the mills at the end of October amounted to about 1,921,000 bbls., compared with 2,336,000 bbls. (revised) at the beginning of the month.

MONTHLY FLUCTUATIONS IN PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT



(A) Stocks of finished portland cement at factories.
(B) Production of finished portland cement.
(C) Shipments of finished portland cement from factories.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT IN SEPTEMBER, 1922, AND PRECEDING MONTHS *a*

Month	Imports (bbls.)		Exports (bbls.)	
	1921	1922	1921	1922
January	14,678	17,036	225,561	70,725
February	18,269	5,157	84,230	82,421
March	7,631	1,597	97,302	103,556
April	1,540	10,855	93,009	75,412
May	2,035	2,521	82,409	100,068
June	1,657	14,179	100,831	96,263
July	3,455	958	81,091	119,491
August	10,988	56,757	84,538	105,156
September	5,177	*b*42,641	84,668	78,615
October	11,448	*c*	79,871	*c*
November	20,112	....	71,214	....
December	25,327	....	96,290	....
	122,317	....	1,181,014	....

a Compiled from records of the Bureau of Foreign and Domestic Commerce.
b Imported during period September 1-21, inclusive.
c Imports and exports in October, 1922, are not available.

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement from September 1 to 21, inclusive, amounted to 42,641 bbls., valued at $88,724. The total imports in 1921 amounted to 122,317 bbls., valued at $388,828. The imports in September were from Canada, 35,965 bbls.; Denmark, 5,040 bbls.; Belgium, 1,352 bbls.; Japan, 250 bbls.; Mexico, 31 bbls.; and Norway, 3 bbls. The imports were received in the following districts: Vermont, 18,326 bbls.; Porto Rico, 14,282 bbls.; St. Lawrence, 3,849 bbls.; Rochester, 2,228 bbls.; Michigan, 2,032 bbls.; San Francisco, 1,352 bbls.; Maine and New Hampshire, 288 bbls.; Hawaii, 250 bbls.; San Antonio, 31 bbls.; and New York, 3 bbls.

The exports of hydraulic cement in September were 78,615 bbls., valued at $219,898; of this total 77,818 bbls., valued at $214,812, was portland cement, which was sent to Cuba, 30,252 bbls.; to the other West Indies, 4,478 bbls.; to South America, 28,440 bbls.; to Mexico, 7,514 bbls.; Central America, 5,539 bbls.; Canada, 515 bbls.; and to other countries, 1,080 bbls. The total exports of hydraulic cement in 1921 were 1,181,014 bbls., valued at $4,276,986.

The statistics of imports and exports of hydraulic cement in October were not available.

What Are You Doing With Your Scrap?[1]

If scrap material is allowed to accumulate around a cement plant, it soon becomes a nuisance and a danger to the workmen. The alternative is to collect it frequently and dispose of it in the most profitable way. What are you doing with yours?

It is often possible to salvage much of the scrap and make use of it at the plant, if the material is so kept that inspection of it is easy. To this end some cement plants have found it of great benefit to construct concrete bins in which the various kinds of scrap can be deposited. These bins are generally so located that railroad cars or a locomotive crane can be run up alongside them, thus facilitating loading or unloading.

An additional feature in separating scrap into different classes is that it becomes more easily salable and demands a better price. The secret of how the junk dealer makes his profit can be found in the separating into different classes of the scrap he buys on his travels. At little expense the average plant can reserve a great portion of this profit for itself, as demonstrated in one case. A new superintendent, on taking charge of a plant, found much useless material in yards and buildings. He had all this refuse gathered into a heap and obtained from a junk dealer a bid of about $400 for it. By building bins and utilizing labor at slack times, the superintendent had the different kinds of material segregated at a cost of $208, and then sold it for $982, an increase of $582 over the junk dealer's bids for it in unsorted condition. Although this gain did not materially increase the company's dividends, it did help to decrease operating cost and to stimulate economy in other directions, to say nothing of the improvement in safety and working conditions in yard, buildings and store rooms.

A few easily accessible concrete junk bins pay for themselves in a short time. Why not build them now, so that you can begin your spring house cleaning and get all that junk out of the way?

Good housekeeping in a cement plant is not only an effective way of reducing accidents, but promotes efficiency in production as well, and helps reduce cost of operation.

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[1] From *Accident Prevention Bulletin*, Portland Cement Association.

Cement Mill Employes Increase in Number

The Department of Commerce announces that reports made to the Bureau of the Census show a considerable increase in the activities of the establishments engaged primarily in the manufacture of cement during the year 1921, as compared with 1919. The total value of products reported amounted to $203,627,000 in 1921, and to $175,265,000 in 1919, an increase of 16.2%.

The increase in production was accompanied by increases in the number of persons employed, in the total amount paid during the year for salaries and wages, and principally in the cost of materials used. Of the 125 establishments reporting in 1921, 21 were located in Pennsylvania; 12 in New York, 11 in Michigan, 9 in California, 8 in Kansas, 6 in Ohio, 5 each in Illinois, Indiana, Missouri, and Texas 4 each in Alabama, Iowa, Utah, and Washington; 3 in Minnesota; 2 each in Colorado, Maryland, Montana, New Jersey, Oklahoma, Oregon, and Tennessee; and 1 each in Georgia, Kentucky, Nebraska, Virginia, and West Virginia. Pennsylvania, the leading state in the industry in 1921, produced 26.8% of the total value of products in that year.

There was some fluctuation in the number of wage earners employed each month during 1921. In September, the month of maximum employment, 28,043 wage earners were reported, and in January, the month of minimum employment, 22,198—the minimum representing 79.2% of the maximum. The average number employed during the year was 26,231 in 1921, as compared with 25,524 in 1919. A classification with reference to the prevailing hours of labor in the establishments in which employed shows that for 10,312, or 39.3% of the total (average) number of wage earners, the prevailing hours were over 60 per week; for 6,157, or 23.5%, 60 per week; and for 7,419, or 28.3%, between 54 and 60.

The returns indicate that the combined output of all establishments was approximately 66% of the maximum capacity, based upon a demand requiring full running time.

The statistics for 1921 and 1919 are summarized in the following statement. The figures for 1921 are preliminary and subject to such change and correction as may be found necessary from a further examination of the original reports.

Comparative Summary of Statistics for the Cement Industry 1921 and 1919

	1921*	1919*	Per Cent of Increase†
Number of establishments	125	123	1.6
Persons engaged	30,907	30,247	2.1
Proprietors and firm members	16	9	....
Salaried employees	4,660	4,714	—1.1
Wage earners, (average number)	26,231	25,524	2.8
Salary and wage payments	$44,959,000	$42,691,000	5.3
Salaries	10,543,000	9,496,000	11.0
Wages	34,416,000	33,195,000	3.7
Contract work	302,000	266,000	13.5
Cost of materials	102,360,000	79,510,000	28.7
Value of products	203,627,000	175,265,000	16.2
Value added by manufacture‡	101,267,000	95,755,000	5.8

* Figures given for 1921 do not include one establishment reporting products below $5,000 in value. The figures for 1919, however, include two establishments of this class.

† A minus sign (—) denotes decrease. Percentages omitted where base is less than 100.

‡ Value of products less cost of materials.

The following table gives detailed statistics relative to the production of cement, as reported by the United States Geological Survey:

	1921	1919	Per Cent of Increase*
Products, total value	$203,627,000	$175,265,000	16.2
Cement:			
Barrels	99,063,000	81,307,000	21.8
Value	$184,801,000	$138,714,000	33.2
Portland—			
Barrels	98,293,000	80,778,000	21.7
Value	$183,808,000	$138,130,000	33.1
Average unit value	$1.87	$1.71	
Natural and puzzolan—			
Barrels	770,000	529,000	45.6
Value	$993,000	$584,000	70.0
Average unit value	$1.29	$1.10	
All other products (including containers):			
Value	$18,826,000	$36,551,000	—48.5

* A minus sign (—) denotes decrease.

Prices of Cement in Cuba[1]

By Harold D. Clum

American Consul, Santiago de Cuba

The following quotations on cement, received (June, 1922) by one of the leading importers in this city (Santiago), and statements of expense which would be incurred in placing the goods in warehouse on the wharf, duty paid, may be of interest. The prices are per barrel, of 180 kilograms (395.8 lbs.) gross weight.

	American	Norwegian	Swedish	[2]German
Price F. O. B.	$2.53 (New York)			$2.42 (Hamburg)
Freight	.60			1.30
Prices C. I. F. (Santiago)	$3.13	$2.40	$2.75[1]	$3.72
Duty	.54	.68	.68	.68
Port charges	.13	.15	.15	.15
Wharfage	.50	.50	.50	.50
Total cost	$4.30	$3.73	$4.08	$5.05

[1] 12S 6d at $4.40 to the pound sterling.

[2] 11S at $4.40 to the pound; no change since February.

The American quotation is for a well known mark of American cement. The price on Norwegian cement is quoted by a general agent in the United States. That on the Swedish product is from a Hamburg house that formerly shipped German cement, but has evidently given up all hope of marketing the German article under present conditions. The American price is for minimum lots of 2,500 bbls.; for smaller amounts it would be $2.69 f. o. b. New York. The quotation on Norwegian cement is for minimum lots of 2,000 bbls.; the Swedish is for any quantity.

Analyses of the American and Norwegian cements show the following results:

Silica	24.67%	22.30%
Iron oxide	.51	2.87
Aluminum oxide	5.85	6.26
Calcium oxide	63.26	64.08
Magnesium oxide	1.19	1.45
Sulfuric anhydride	1.83	1.63
Loss on ignition	2.13	1.05
Insoluble substances		.41
Total	99.44	
Tensile strength per square inch. (1 cement: 3 sand)		
Average 7 days	331 pounds	324 pounds
Average 28 days	467 pounds	461 pounds
Percentage of water used in Sand mortar	10.3%	10.3%
Time for setting,		
Initial	2 h. 30 min.	2 h. 50 min.
Final	5 h.	4 h. 40 min.
Residue on 200 sieve	6.9%	10.9%

It is understood that the low price at which the Norwegian cement can be sold is due to the use of water power in its manufacture and to low freight rates by Norwegian vessels. The importer who furnished this information hopes to introduce this Norwegian cement here, but is deterred for the present by the fact that although the quotation was originally made for shipment in barrels, the manufacturers or their agent desires to ship in bags. This market demands cement in barrels, on account of the danger of wetting, and because the consumers are accustomed to buying it in barrels.

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[1] From report to Department of Commerce.

The Place of Scientific Research in the Program of Trade Associations[1]

By Edward R. Weidlein
Director, Mellon Institute of Industrial Research of the University of Pittsburgh

The Trade Association and Research

To return to association research and the co-ordinated, productive teamwork for technical advancement which it promotes, a prominent chemist recently addressed an inquiry to ten leading associations of manufacturers which are conducting research, requesting an expression of opinion respecting the value of scientific investigation. The officials of these associations were all warm in their commendation of its technical usefulness and commercial remunerativeness. They were unanimous in endorsing the laboratory as an essential adjunct to the plant.

In general, it may be said that the trade associations which are supporting scientific investigation in this country consist of those firms in an industry whose interests are sufficiently homogeneous to induce them to pool their resources for the purpose of research. The research laboratories maintained by these associations of manufacturers not only enable a central group of scientists to be of direct service to a number of industrial concerns instead of to an individual company, but their successful operation also gives rise to more stable relations of cooperation among the company members of these associations by the induction of the reciprocal exchange of experience and research results. Laboratories of this type act as clearing houses of information for the industrial associations, and give technical assistance and scientific advice to the company members. One of the prominent advantages of industrial association research in a central laboratory maintained in common by all the company members of the association is that, *inter alia,* it enables a small manufacturer, who cannot afford to support a laboratory of his own, to profit from the investigatory work in the same way as the larger manufacturer. Indeed, industrial association research reduces the cost factor to a minimum and thus promotes the welfare of the manufacturers in the field concerned, without respect to size.

The centralization of research effort, such as is done in the laboratories maintained by industrial associations, prevents unnecessary repetition in scientific inquiries. Theodore N. Vail once said, "By carefully avoiding a duplication of work and by utilizing all that pioneer investigators have done, the fruitfulness of research can be greatly increased."

Objects of the Industrial Research Laboratory

The objects of every properly operated industrial research laboratory are three in number, viz.: (1) The creation of technically important knowledge; (2) the dissemination of knowledge and the direct industrial application of such knowledge; and (3) systematic cooperation, through contact, with the other departments of the industry, and, in the case of associations, with all divisions of the association office, as well as with all company members, either directly or through the central office. It follows that in the long run an industrial research establishment must be known by the successful commercial processes which it has developed and by the published accounts of the investigations conducted in it.

It is of prime importance to the progress of science and technology to transmit as soon as possible after their completion trustworthy records of methods, achievements, and even of errors and failures. Industrial associations almost without exception find it expedient to release the research findings of their laboratories for publication. While the individual manufacturer might find it desirable to retain entirely for his own use the results of researches supported by him, the industrial association invariably encourages research on problems of general interest and consequently it would be a near-sighted policy to hold back the results from the public. It is in association research work that the publicity value of research becomes most apparent.

Results of Industrial Research

It remains to conclude by summarizing the effects on the welfare of any industry which organized scientific research is likely to have.

There is first of all the direct effect. A full knowledge, widespread through the industry, of the principles underlying works and mill practice will enable it to look forward to the future without dread. It should be emphasized that improvements in mechanical appliances and the introduction of more scientific processes are not likely to have the effect of diminishing the number of persons engaged in a well organized industry. Every improvement in the methods of production will have one of two results: Either it makes the goods more cheaply, or it makes them better. If it makes them more cheaply, it enlarges the existing demand; if it makes them better, it attracts a new market. In every case, then, both labor and capital—to use the common terms—are likely to benefit. The extension of the commercial uses of industrial products, another consequence of research, is also beneficial to the public as well as to the manufacturers interested.

There are other indirect gains which may be noted in passing. The first is that an industry conducted on scientific lines attracts a better type of worker than one where no scope for the use of scientific knowledge exists. Therefore, the more use that we make of science, the more do we raise the standard of education among workmen.

There is a second indirect gain from research. Everyone who begins to have experience of industrial research at once looks at the industry from a new viewpoint. Many men have had this experience and have found that what they had regarded as a dull round of mechanical operations, pursued solely for the sake of making a living, is in fact an interesting subject of study. From the time that they have begun to realize the possibility of improvement through knowledge, their work has become their hobby; and what man, whether workman or industrialist, is more fortunate than he who is daily absorbed in an occupation in which he has a living interest?

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[1] Abstracted from an address delivered at the Fourth Annual Convention of the National Lime Association, Cleveland, Ohio, June 16, 1922.

Recent Improvements in Manufacture of Artificial Cements[1]

A review of the status of the cement industry and the progress during the past two decades is not without interest at this time, on the eve of the congress at Liege.

1. Methods of Analysis, Rules for Proportioning, Elements Constituting Cement, New Cements

The methods of analysis have not been changed. The determination of silica by acetic acid, as provided by the Germans and adopted by Mr. Hendrickx, the distinguished director of the plants at Poliet and Chausson, does not appear to have become general.

On the whole, the approximate methods of Professor Chesneau have, at least in France, been maintained as a result of the studies pursued by the group of members of the French language pertaining to the International Association of Testing Materials in 1913 and 1914.

These methods also give satisfaction, although they are not very rapid.

A possible improvement, which had been initiated by Mr. Le Chatelier, and a lesson which deserves repetition, is based upon the automatic performance of these analyses.

Chemists ought to operate not only using the same quantities of solids and liquids, but should use the same reactive agents, whether in form of compressed pastes or vials of the same weight containing the same ingredients, so that all the chemist has to do is to add the equal volume of liquids. The establishment Poulenc is at present furnishing compressed pastes for the use in preparing photographic baths, and this method might well be generalized.

At factories where a considerable number of analyses are required, the manual labor should be reduced to a minimum, and as much of the laboratory work should be made automatic as can be arranged.

The manager of any establishment has plenty to do, and cannot make his own analyses. If a professional chemist is added, it would raise the overhead, and the chemist, if he amounts to anything, will not care to be bothered with the daily analyses, and will require a research laboratory as well.

The location of a research laboratory in the factory is not to be recommended, as not only is it difficult to mix the research end of a business with the commercial end, but some apprehension will always exist as to the exploitation of discoveries by witnessing employees to competitors.

Therefore, control laboratories for current inspection should be separate from the research laboratory, and be arranged as far as possible for automatic operation.

The rules for proportioning given by Messrs. Le Chatelier, Newberry, Michaelis and Hendrickx are standard, but exact obeyance to these formulas is not considered as necessary as formerly.

As each of these formulas give different results, the above conclusion follows *a priori.* Nevertheless, the variations are far more considerable than before has been admitted.

I do not know if anyone has continued the study of the boiling tests of cement pats by Mr. Hendrickx, a matter of great interest. The study of the different pats used for the boiling test is particularly interesting, inasmuch as very slight changes in the composition of the pats, according to the greater facility of the boiling, may indicate economical advantages in the grinding of the raw material.

Our knowledge of the constititive elements of cement has made little progress.

The artificial as well as the natural cements in the market are composed of crystals in a vitreous solution. What influence the size and number of these crystals have we do not know. However, I dare say that at present it is beyond doubt that artificial cements are formed by the liberation of lime by a slow heat, just as has been announced by Leduc several years ago. The probability is that the vitreous solution or mix is decomposed in being devitrified.

A similar phenomenon occurs in the basic slags of blast furnaces. The glassy or vitreous slags absorb lime when in contact with limewater, but as they have preliminarily been exposed to a slow heat, they lose lime instead of absorbing it. Thus they are devitrified in liberating a body capable of losing lime in the presence of water.

The work of Mr. Portevin on the devitrification of basalt might be utilized by cement manufacturers. The rapidity of the formation of stones and the rapidity of the growth of the latter, might some day be coped with, with interesting results for the improvement of hydraulic products.

The use of the polarizing microscope in the study of clinkers has not solved the difficulty in making thin sheets of clinkers, thin enough to use like essence or benzine for waterproofing.

The experiments of Campbell on the constitutive elements of cement deserve to be continued, and in perfecting them no doubt interesting indications will follow.

The scope of this article is far too narrow to permit any extensive reference to natural cements, which incorrectly are named after the *firms* manufacturing them, or according to the method of production—basic cement, electric cement, electro-basic cement, etc. *These cements do not obtain their characteristics by being produced by fusion,* but on account of their chemical composition. Fusion is only resorted to because otherwise homogeneous clinkerization would be impossible. The Americans, who have studied the different properties of the alumnates, both pure and impure, only work with clinkers obtained in a rotary kiln 2 ft. in diameter and 20 ft. long.

When commercial rivalry, with its meanness, shall have ceased, only natural or aluminous cement will be mentioned, cements in which the contents of alumina is at least equal to that of silica, and that will be the only name for this class of cements in the future, leaving aside the name of the manufacturer, as having only a secondary influence on the quality.

The Swiss firm, d'Olderbanck, produces an artificial cement of particular merit. This cement is simply the product of a slightly high mixture of lime and exceedingly careful methods. It cannot be compared to the natural cements, with which it has nothing in common, having no gypsum or sulphurous anhydrides.

Is it too early or too late to mention cements containing gypsum? This method, suggested by Mr. Basset shortly before the war, was used during the hostilities by Germany in the Badische, but has since been abandoned, which seems to indicate that the cost was too high. However, other attempts have been made in this direction, and I have lately learned from Germany of clinkers obtained in rotary kilns charged with mixtures of argillaceous substances and sulphate of lime. The cement resulting was of a good quality. The sulphuric acid did not go beyond 3%, but according to what I have been told the consumption of coal made the process prohibitive.

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[1] An article by M. Bied, translated from *Le Ciment* by E. Lee Heidenreich.

Several articles have lately appeared concerning "double burning." Some of the adherents to this process seem not to realize that the advantage of double burning lies in the fact that the decarbonization and the burning need not take place in the same kiln. What I recommend is the burning several times. I hope to revert to this subject.

2. Burning

The latest improvements point to stationary kilns. The best results are no longer obtained by stationary kilns automatically fed and discharged. The firms, Buhler, Mannstaedt, Thiele, Ch. Candlot, present different systems which seem to function perfectly. As the question of the wear and tear of the apparatus for discharge is of the utmost importance, careful selection must be made from this point of view, but the rotary kilns have not had their last word in this battle between the two kinds, and we cannot as yet predict the victory. Besides, it is probable that each kiln has its own special application. One thing is sure, that the stationary kiln with automatic discharge is the only one suitable for natural cements, but when the materials are hard to mix the rotary kiln comes into its own.

As a matter of fact, instead of making the rotary kiln excessively long and thereby increasing its price, they are being made considerably shorter, and to utilize the loss in gas, it is being used to dry the raw material or for motive power purposes. Thus the entire power for grinding may be obtained free of cost. It seems that it is getting known, what I have advocated for a long time, that however carefully the work is done, there is always a great many calories lost in the operation. The majority of the gas at 900° C. contains a number of calories in excess of what is required to heat or burn the stone or marl to decarbonization. But the difficulty remains, as I indicated in *Revue de l'Ingenieur*" in December, 1920 and January, 1921, that to secure the necessary calories for decarbonization of the raw material it is necessary to use excessive temperatures in the zone of combustion, and this is the reason for clinkering at this point, which is so objectionable both in stationary and rotary kilns. This is the reason why the lining of kilns is so rapidly used up that the wear and tear is such an important item. It might be of advantage to do the burning or roasting in several turns, as I have proposed, and this method would be as applicable to stationary as to rotary kilns. The process of *"double roasting"* means *roasting twice*, or *burning twice*.

With all that has been said, there is great progress to be had from the preparation of cement pats for boiling.

3. Grinding of Burned or Raw Materials

It does not seem that tangible improvements have been made in the grinding of the burned or the raw materials. The compound and triplex grinders replace more and more the ball mills, and the pulverizers the pug mills to finish the raw material. One concern actually is trying to so modify its grinders as to control all the factors which influence the pulverization, of which factors one of the principal ones has generally been neglected.

Everybody knows these factors, only mentioning the most important ones: (1) the hardness of the material; (2) the weight of the balls; (3) the size of the balls; (4) the size of the raw material entering; (5) the size when leaving the grinder; (6) the time of pulverization; (7) the relation between the weights of the pulverized material and the balls.

Experience has shown that to increase the fineness the relation between the weights of the pulverized material and that of the balls should be decreased. If, when entering a compound or triplex the relation between the weights of the material and the grinding elements are about one-fifth, the relation should not be more than one-tenth to obtain fine results. Those who have made tests of a pulverizing kiln for cement, showing 18% at 4.900 mesh, know that a fineness of 22% is already obtained in the middle of the kiln, and therefore one-half of the motive power is used to increase the fineness 4%.

It is for this reason that Ch. Candlot has arranged his apparatus at his plant so as to materially increase the pulverized output for a certain amount of motive power.

Correction Factor of Standard Cement Samples

During the month of October there arose a question as to the clearness of the term "correction factor" as applied to corrections for No. 200 sieves and used in certificates for the same issued by the Bureau of Standards.

Earlier in the year the Bureau of Public Roads of the Department of Agriculture sent out portions of a cooperative sample of portland cement to various state laboratories for comparative tests. The results of these tests in several instances showed a lack of knowledge of the proper application of the term "correction factor" for No. 200 sieves, some using it as a multiplier and others to derive a ratio for the correction of the sieve tests. It therefore seems appropriate to devote a little attention to just what is meant by this factor.

The "correction factor" for No. 200 sieves is either additive or subtractive, indicated by the words and signs plus (+) and minus (—). It is applied to the last operation in the sieve test, the per cent passing the sieve, and the result of the application is the true fineness of the material which has been tested.

While the wording of the No. 200 sieve certificate in reference to the application of the "correction factor" seems clear, it is thought that confusion may be avoided by eliminating the word "factor." A revision of the No. 200 sieve certificate is therefore being considered. However, it is thought advisable before revising the certificates to make a further study of the laws governing the application of correction factors, over what ranges they are constant, and their variation with the varying degrees of fineness. Although this investigation has been delayed for some time because of the press of work in the laboratories, it is hoped to carry it to completion as soon as possible.—*Bureau of Standards.*

Duty on Canadian Cement

Customs collectors have been notified to assess a duty of 8c per 100 lbs. on cement imported from Canada. Cement is on the free list in the new tariff law, with the proviso, however, that the same duty may be assessed on imported cement as that imposed by the country of origin on cement imported from the United States. It is this proviso that the Customs Service has invoked and the duty of 8c per 100 lbs. is the same as that imposed by Canada on cement from American mills.

Portland Cement Association Elects New Officers

At the annual meeting of the Portland Cement Association, held in Chicago, November 20, 21, and 22, which was the twentieth anniversary meeting, the following new officers were elected:

President—F. W. Kelley, president Helderberg Cement Co.

First Vice-President—Blaine S. Smith, general sales manager Universal Portland Cement Co.

Second Vice-President—L. R. Burch, assistant to president, Atlas Portland Cement Co.

Treasurer—Col. E. M. Young, vice-president Lehigh Portland Cement Co.

W. M. Kinney continues as secretary and general manager, as do also the following officers: F. L. Page, assistant treasurer and assistant secretary; J. W. Johnston, assistant general manager in charge of eastern offices; C. N. Reitze, assistant general manager in charge of Pacific coast offices, and G. E. Warren, assistant general manager.

National Lime Association Appoints Division Managers

In line with the National Lime Association's policy recently announced for increasing activities in the direction of research and educational work, a division headquarters office has been established at Chicago to cover the central part of the United States, and another division headquarters office has been established in Washington—this is in addition to the National headquarters located in the same city—and will have jurisdiction over the eastern part of the United States. A division manager, in the person of G. B. Arthur, has become connected with the Association at its Central division headquarters at 79 West Monroe street, in Chicago, and Henry M. Camp has been selected division manager for the eastern division headquarters at Washington. The association has taken on about twenty additional engineers and chemists who will travel throughout these two divisions, disseminating knowledge on the properties and uses of lime and helping to work out the problems of the consumers.

The laboratories of the Association have been greatly enlarged and the fellowship work in different universities of the country has been increased to a great extent.

In fact, the Association has begun a very active campaign in investigating the properties and best methods of using lime and lime products and in disseminating this information to the consumers to whom it might be useful.

Spencer B. Newberry Passes

Spencer B. Newberry, president and general manager of the Sandusky Cement Co., died quite suddenly Tuesday, November 28, while driving to his office in Cleveland, Ohio.

Mr. Newberry was well known among cement manufacturers and scientists in the United States and Europe, and was always a strong advocate of better cement.

In the "Progress Review of Twenty Years," issued by the Portland Cement Association in commemoration of its twentieth anniversary meeting, held in Chicago, November 20 to 22 last, Mr. Newberry summarized the progress in the scientific study of portland cement and urged that the association take a more active part in the investigation to answer the question, "How good can portland cement be?"

He has served as a director of the Portland Cement Association for several years.

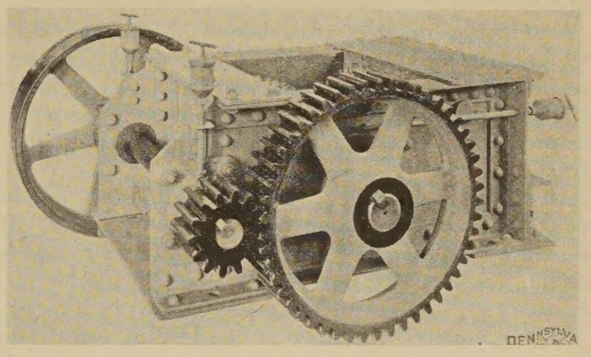
Pennsylvania Armorframe Single Roll Coal Crusher

The latest development in a single roll coal crusher by the Pennsylvania Crusher Co., which marks a fundamental improvement in single roll design, provides a frame fabricated from slab steel plates into an unbreakable unit.

In the 18-in. by 18-in. and the 18-in. by 24-in. sizes, in which this design is now available, the steel side plates are 1 in. thick, and are connected by nine steel cross members, all heavily hot riveted into this rigid box frame.

Bronze bushed bearings are shouldered into the heavy side plates, so that the bearing bolts are not subjected to shear.

The heavy flywheel pulley which drives the roll through heavy cut, back gearing, is provided with a shear pin safety device, mounting a steel bolt in hardened bushings, thereby insuring full protection of the crusher parts against the accidental introduction of tramp iron with coal.



THE ARMORFRAME SINGLE ROLL COAL CRUSHER

The breaker plate is a massive casting of high grade charcoal iron deeply chilled on the crushing surface. It is hinged in the frame at the upper end and suspended at the lower end by means of powerful relief springs. The breaker plate tip, which takes most of the wear, is a reversible and renewable manganese steel casting.

The segmental roll is cast from high grade charcoal iron, deeply chilled, or from chrome steel.

Convenient provision for adequate lubrication has been made by means of large steamboat type grease cups, which can be screwed down without coming into close proximity with moving parts.

The crusher proportions are unusually liberal throughout, and designed to insure a continuous supply of uniformly crushed coal by affording the three safeguards—unbreakable steel frame, steel shear pin safety device and powerful relief springs—as protection against the heavy tramp iron encountered in R. O. M. bituminous coal, which often has proven destructive to crushing machinery.

Men and Mills

Notes from the Field

The plant of the Western States Portland Cement Co., near Bettendorf, Iowa, will be rushed to completion, with the idea of being ready to start production as early in 1923 as possible, according to reports from that locality.

Officials of the Kelley Island Lime and Transport Co. recently visited Alpena and Rockport, the visit being occasioned by the commissioning of the first big steel freighter of the Rockport Steamship Co. The ship, which is named after John A. Kling, president of the Kelley Island company, will carry stone and with its own fleet of boats the Kelley Island company will be able to facilitate shipments from Rockport.

Notwithstanding the great scarcity of coal this year, the Peerless Portland Cement Co., of Quincy, Mich., is making a record run this season. The factory has been in continuous operation night and day ever since early in the year, and the annual shut-down will probably not occur until about the usual time, just before the holidays.

F. D. Wood, superintendent of the Hercules Cement Co., has resigned his position.

A reduction of 25 cents a barrel in cement, effective October 19, was announced by the manufacturers in the Lehigh region. Some time ago there was an increase of about the same amount, and the reduction brings the price down to the point it was at the time of the increase.

All the plants in the vicinity of Bath, Pa., are busy and there is a large demand for their product. The mills are shipping all the cement the railroads can handle.

Representatives of fifteen of the leading cement companies in the country recently met in Allentown, Pa., to discuss freight rates on cement preliminary to discussions with public service carriers.

Seventy carloads of finished cement were shipped recently from the plant of the Superior Portland Cement Co., a record shipment for one day from the local plant. The seventy cars carried 11,000 bbls. of cement.

The Wolverine portland cement plant at Quincy, Mich., has ceased operations, due to the scarcity of coal and the falling off of the demand of cement. The Coldwater plant is still in operation.

R. P. Butchart, Victoria, B. C., president of the Oregon Portland Cement Co., recently inspected cement plants in Oregon and California.

The truck garage of the Bath Portland Cement Co. was destroyed by fire on November 15. It was a brick structure with corrugated roof. The two motor trucks and four automobiles in the building at the time were a total loss.

The Oregon Portland Cement Co., whose manufacturing plant is at Oswego, has just paid a dividend of 7% on the preferred stock, of which $875,000 is outstanding. This dividend payment makes 17½% paid this year. An initial dividend of 3½% was paid late in 1921. Inasmuch as the 7% preferred stock is entitled to cumulative dividends from January 1, 1916, and 21% has been paid, there will be 28% due in dividends the first of next year to pay up for the seven years.

At No. 4 plant of the Alpha Portland Cement Co. at Martin's Creek, Pa., there are four big projects now going on. Approximately $100,000 is to be expended there in order to economize in heat and power, according to local reports.

William M. Floring, who for several years was in charge of sales for the Knickerbocker Portland Cement Co. of New York, is now Manager of Sales of the roofing department of Safepack Mills, Boston, Mass.

The Hermitage Portland Cement Co. intends taking some definite steps toward starting construction on its plant on or about January 1st, 1923. The company is going ahead with its financing plans and it is understood that the financing has about been completed.

Recent shipments from Ruggles-Coles Engineering Co. include a Ruggles-Coles class A8 dryer to T. H. Symington Co., Rochester, N. Y., for drying coal in its pulverized coal plant; a class F0 dryer to the Silica Products Co., Lowville, N. Y., for drying sand; a class A12 dryer to the Brown Corporation, La Toque, Que., Canada, for drying lime sludge.

The Kosmos Portland Cement Co. is making good progress with the proposed changes in its coal mill. The company is installing two 42-in. Fuller mills for the pulverizing of coal in the place of a former installation of four 33-in. Fuller mills. The number of units will be reduced and it is expected to get better operating efficiency with the larger mills, as the new 42-in. Fuller mills have several new features that go to make quite an improvement over the earlier 42-in. mills.

The Genesee Lime Co., of Honeoye Falls, N. Y., is permanently out of business.

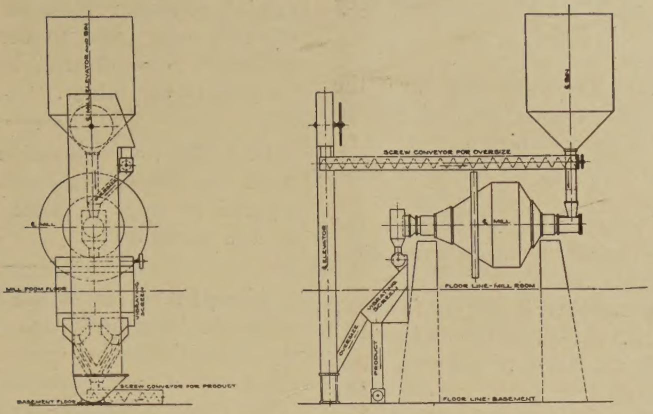
Tamesaburo Yamamoto, Osaka, Japan, interested in the ceramic industry, and Toyoji Wadi, president of the Fuji Spinning Co., Tokyo, Japan, interested in numerous cement manufacturing plants in Japan, together with three other Japanese interested in different industries, recently made a tour of the United States, visiting various plants in the industries in which they are interested.

W. W. Sayers, of the Link-Belt Co., has been promoted to the position of chief engineer of the company's Philadelphia works and eastern operations.

For many years Mr. Sayers was a representative of the company in its Chicago territory, in the lines related to power house machinery, coal storage, Peck carriers, crushers, etc., and later in charge of the locomotive crane department.

His headquarters will be at the Philadelphia office for the future.

During October the Colorado Portland Cement Co. ground 104,695 bbls. of cement and shipped 107,695 bbls. The past summer has been phenomenal and had



ARRANGEMENT Nº 3
HARDINGE MILL OPERATING IN CLOSED CIRCUIT WITH VIBRATING SCREEN
WHEN THERE IS A BASEMENT

Boosting the Price of Limestone

Here is a way to take your screenings, grind them, and sell them for from two to four times the amount they would otherwise bring.

You know there is a market for ground agricultural limestone, but do you know there are also other uses commanding even a better price?

For instance, finely ground limestone is extensively used as a filler for asphalt paving and commands a better price than does the ordinary agricultural limestone.

Write us and we will give you some interesting information not only in connection with the uses for limestone but how best to grind it.

It is the cost of grinding and flexibility of the plant to handle various products that determine whether or not the project will be practical.

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"HARDINGMIL NEW YORK"

Hardinge Conical Mills

cars been available so that shipments could have kept up with sales, even greater records would have been made. The clinker storage pile has been entirely cleaned up, so that the company is now able to grind only what clinker is burned each day. Cement bins are also very low.

For the last eight months the following are the monthly averages: Burned, 84,337 bbls.; ground, 99,930 bbls.; shipped 95,300 bbls. Two different months 111,000 bbls. were shipped, and one month 110,226 bbls. were ground.

A new drilling record has also been established in the shale quarry, the drill having made 11 ft. per hour, days at a time.

On November 1, 85 holes, ranging in depth from 35 to 50 ft., were loaded with 19,900 lbs. of Giant powder, and, although the shot lay in the form of a horse shoe, tightly bound in by undisturbed lime rock, 108,500 tons of lime were thrown out and well shattered, giving 2.65 yds. per lb. of powder, or 5.45 tons per lb. of explosive.

During the first half of November, the Universal Portland Cement Co. reported a serious shortage of cars in which to make shipments.

Claude K. Boettcher, vice-president of the Cement Securities Co., operating in Colorado, Montana, Utah, Oklahoma and Nebraska, is quoted as stating that increasing business necessitates the erection of more storage rooms. Four rooms, with a capacity of 500,000 bbls. of cement, will be constructed, two in Colorado, one at Ada, Okla., and one at Three Forks, Mont. The Oklahoma plant is being worked at full capacity and will make 1,200,000 bbls. of cement during 1922.

The local financial market shows many buyers for Cement Security bonds.

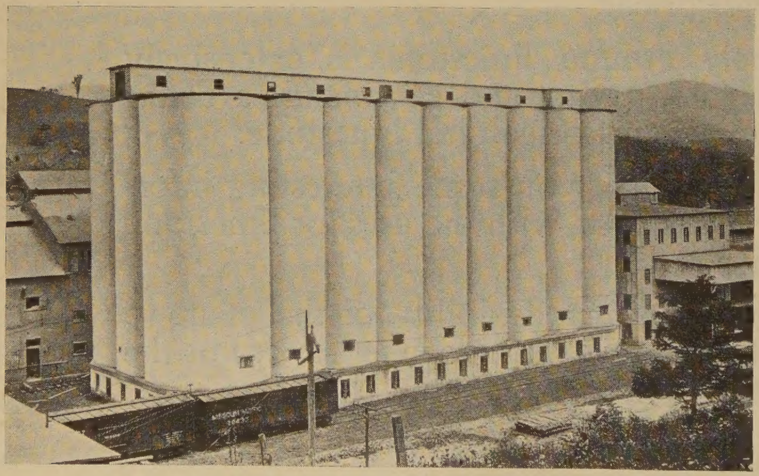
Scarcity of unskilled labor was becoming acute in the Lehigh cement regions in October. A large number of laborers who came to the region last spring from the anthracite coal district because of the strike, were returning to the mines.

O. Lellep, a combustion engineer doing experimental work for the Giant Portland Cement Co., Egypt, was injured recently in some of the apparatus with which he was working.

Abrupt recovery of the failing cement supply, with an adequate local provision thereby made certain, led to the cancellation of proceedings before the Interstate Commerce Commission seeking to establish a lower rate from Utah mills to Portland, Oregon. The hearing, which has been abandoned by order of the commission, was to have been here November 23, before Examiner Flynn. The local mills now are operating and are fully competent to meet the demand, plus, of course, the usual importations from mills outside of Oregon and in the competitive field.

POSITION WANTED. Cement Mill Manager or Superintendent, sixteen years' experience in like positions, best references, all communications strictly confidential. Box 1337, c/o Concrete, 1807 East Grand Blvd., Detroit, Mich.

DEEP BIN STORAGE FOR CEMENT



Storage and Packing Plant Built for the Lehigh Portland Cement Co., Fordwick, Virginia. 185,000 Barrel Storage Capacity.

We specialize in the construction of concrete storage bins and packing plants for cement, also storage bins for crushed rock, coal, raw mix, clinker, etc.

We have built storage structures for a great many cement companies thruout the country.

Let our engineers tell you about the economies of our method of construction.

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